

## **DETAILED ACTION**

### ***Restriction***

1. Restriction is required under 35 U.S.C. 121 and 372.

This application contains the following inventions or groups of inventions which are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In accordance with 37 CFR 1.499, applicant is required, in reply to this action, to elect a single invention to which the claims must be restricted.

Group I, claim(s) 1 – 11, drawn to a method for recycling copper.

Group II, claim(s) 12 – 16, drawn to a device used to recycle copper.

2. The inventions listed as Groups I and II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons:

Unity exists only when there is a technical relationship among the claimed inventions involving one or more of the same or corresponding claimed technical features. The expression “special technical features” is defined as meaning those technical features that define a contribution which each of the inventions, considered as a whole, makes over the prior art.”(Rule 13.2). The question of unity of invention has been reconsidered retroactively by the examiner in view of the search performed; a review of Seo et al. (US 2001/0051103 A1) makes clear that the claimed species is not novel over the prior art. Seo et al. disclose a method for recycling copper oxide from

waste etchant created when a printed circuit board is fabricated (see p. 1 paragraph 0002).

Furthermore, this reference appears to demonstrate that the technical feature (i.e. the recycling of copper contained in printed circuit boards) does not define a contribution which each of the inventions, considered as a whole, makes over the prior art. Thus, lack of unity becomes apparent “a posteriori” after taking the prior art into consideration. Accordingly, the prior art of the record supports restriction of the claimed subject matter in to the groups as mentioned immediately above.

### ***Rejoining Practice***

3. The examiner has required restriction between product and process claims. Where applicant elects claims directed to the product, and a product claim is subsequently found allowable, withdrawn process claims that depend from or otherwise include all the limitations of the allowable product claim will be rejoined in accordance with the provisions of MPEP § 821.04. Process claims that depend from or otherwise include all the limitations of the patentable product will be entered as a matter of right if the amendment is presented prior to final rejection or allowance, whichever is earlier. Amendments submitted after final rejection are governed by 37 CFR 1.116; amendments submitted after allowance are governed by 37 CFR 1.312.

In the event of rejoinder, the requirement for restriction between the product claims and the rejoined process claims will be withdrawn, and the rejoined process claims will be fully examined for patentability in accordance with 37 CFR 1.104. Thus, to

be allowable, the rejoined claims must meet all criteria for patentability including the requirements of 35 U.S.C. 101, 102, 103, and 112. Until an elected product claim is found allowable, an otherwise proper restriction requirement between product claims and process claims may be maintained. Withdrawn process claims that are not commensurate in scope with an allowed product claim will not be rejoined. See “Guidance on Treatment of Product and Process Claims in light of *In re Ochiai*, *In re Brouwer* and 35 U.S.C. § 103(b),” 1184 O.G. 86 (March 26, 1996). Additionally, in order to retain the right to rejoinder in accordance with the above policy, Applicant is advised that the process claims should be amended during prosecution either to maintain dependency on the product claims or to otherwise include the limitations of the product claims. **Failure to do so may result in a loss of the right to rejoinder.**

Further, note that the prohibition against double patenting rejections of 35 U.S.C. 121 does not apply where the restriction requirement is withdrawn by the examiner before the patent issues. See MPEP § 804.01.

### ***Election of Species***

4. This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

The species are as follows:

**Species A** – Claims 1 and 2

A method for recycling copper contained in the discarded printed circuit boards, said method comprising the following steps of: (a) ionizing the copper contained in the discarded printed circuit boards by immersing the discarded printed circuit board in **hydrochloric acid (HCl)**, so as to form a copper chloride ( $\text{CuCl}_2$ ) solution; (b) adding **sodium carbonate ( $\text{Na}_2\text{CO}_3$ )** into the copper chloride solution, thereby resulting in formation of copper carbonate ( $\text{CuCO}_3$ ) and sodium chloride ( $\text{NaCl}$ ); and (c) converting the **copper carbonate** by heating into copper oxide ( $\text{CuO}$ ).

**Species B – Claims 3 and 4**

A method for recycling copper contained in the discarded printed circuit boards, said method comprising the following steps of: (a) ionizing the copper contained in the discarded printed circuit boards by immersing the discarded printed circuit board in **hydrochloric acid (HCl)**, so as to form a copper chloride ( $\text{CuCl}_2$ ) solution; (b) adding **sodium hydroxide (NaOH)** into the copper chloride solution, thereby resulting in formation of copper hydroxide,  $\text{Cu}(\text{OH})_2$ , and sodium chloride ( $\text{NaCl}$ ); and (c) converting the **copper hydroxide** by heating into copper oxide ( $\text{CuO}$ ).

**Species C – Claims 5 and 6**

A method for recycling copper contained in the discarded printed circuit boards, said method comprising the following steps of: (a) ionizing the copper contained in the discarded printed circuit boards by immersing the discarded printed circuit board in **sulfuric acid ( $\text{H}_2\text{SO}_4$ )**, so as to form a copper sulfate ( $\text{CuSO}_4$ ) solution; (b) adding **sodium carbonate ( $\text{Na}_2\text{CO}_3$ )** into the copper chloride solution, thereby resulting in

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formation of copper carbonate ( $\text{CuCO}_3$ ) and sodium sulfate ( $\text{Na}_2\text{SO}_4$ ); and (c) converting the **copper carbonate** by heating into copper oxide ( $\text{CuO}$ ).

**Species D – Claims 7 and 8**

A method for recycling copper contained in the discarded printed circuit boards, said method comprising the following steps of: (a) ionizing the copper contained in the discarded printed circuit boards by immersing the discarded printed circuit board in **sulfuric acid ( $\text{H}_2\text{SO}_4$ )**, so as to form a copper sulfate ( $\text{CuSO}_4$ ) solution; (b) adding **sodium hydroxide ( $\text{NaOH}$ )** into the copper sulphate solution, thereby resulting in formation of copper hydroxide,  $\text{Cu}(\text{OH})_2$ , and sodium sulfate ( $\text{Na}_2\text{SO}_4$ ); and (c) converting the **copper hydroxide** by heating into copper oxide ( $\text{CuO}$ ).

**Species E – Claim 9**

A method for recycling copper contained in the discarded printed circuit boards, said method comprising the following steps of: (a) immersing the discarded printed circuit boards in an **oxalic acid ( $\text{HOOC}\text{COOH}\cdot 2\text{H}_2\text{O}$ )** solution, thereby resulting in formation of copper oxalate ( $\text{CuC}_2\text{O}_4\cdot \frac{1}{2}\text{H}_2\text{O}$ ); and (b) converting the **copper oxalate** by heating in presence of oxygen into copper oxide ( $\text{CuO}$ ).

**Species F – Claim 10**

A method for recycling copper contained in the discarded printed circuit boards, said method comprising the following steps of: (a) ionizing the copper contained in the discarded printed circuit boards by immersing the discarded printed circuit boards in **hydrochloric acid ( $\text{HCl}$ )**, so as to form a copper chloride ( $\text{CuCl}_2$ ) solution; and (b) adding and **aluminum material** into the copper chloride solution, thereby resulting in

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formation of **copper powder** and an **aqueous solution of poly aluminum chloride**,



**Species G – Claim 11**

A method for recycling copper contained in the discarded printed circuit boards, said method comprising the following steps of: (a) ionizing the copper contained in the discarded printed circuit boards by immersing the discarded printed circuit boards in **sulfuric acid ( $\text{H}_2\text{SO}_4$ )**, so as to form a copper sulfate ( $\text{CuSO}_4$ ) solution; and (b) adding and **aluminum material** into the copper sulfate solution, thereby resulting in formation of **copper powder** and an **aluminum sulfate aqueous solution**,  $\text{Al}_2[\text{SO}_4]_3$ .

Applicant is required, in reply to this action, to elect a single species to which the claims shall be restricted if no generic claim is finally held to be allowable. The reply must also identify the claims readable on the elected species, including any claims subsequently added. An argument that a claim is allowable or that all claims are generic is considered non-responsive unless accompanied by an election.

Upon the allowance of a generic claim, applicant will be entitled to consideration of claims to additional species which are written in dependent form or otherwise include all the limitations of an allowed generic claim as provided by 37 CFR 1.141. If claims are added after the election, applicant must indicate which are readable upon the elected species. MPEP § 809.02(a).

5. The claims are deemed to correspond to the species listed above in the following manner:

Species A corresponds to claims 1 and 2.

Species B corresponds to claims 3 and 4.

Species C corresponds to claims 5 and 6.

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Species D corresponds to claims 7 and 8.

Species E corresponds to claim 9.

Species F corresponds to claim 10.

Species G corresponds to claim 11.

The following claim(s) are generic: 1, 3, 5, 7, 9, 10, and 11.

6. The species listed above do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, the species lack the same or corresponding special technical features for the following reasons:

Lack of unity of invention may be directly evident “a priori” if before considering the claims in relation to prior art, they do not share a common technical feature. In the case of a species election, it is understood that they share a genus as a common feature. However, the further limitations (species) are imposed in order to make a contribution over prior art. If these species do not share a common technical feature, then they lack unity.

In the instant application, the seven species A through G do not share a common technical feature. Rather, the acid used to ionize the copper contained in the discarded printed circuit boards (eg. HCl, H<sub>2</sub>SO<sub>4</sub>, or HO<sub>2</sub>CCOOH-2H<sub>2</sub>O) and the additional compound added to the solution (eg. Na<sub>2</sub>CO<sub>3</sub>, NaOH, or aluminum material) differ in each species.

### ***Conclusion***

7. Applicant is advised that the reply to this requirement to be complete must include (i) an election of a species or invention to be examined even though the

requirement be traversed (37 CFR 1.143) and (ii) identification of the claims encompassing the elected invention.

The election of an invention or species may be made with or without traverse. To reserve a right to petition, the election must be made with traverse. If the reply does not distinctly and specifically point out supposed errors in the restriction requirement, the election shall be treated as an election without traverse.

Should applicant traverse on the ground that the inventions or species are not patentably distinct, applicant should submit evidence or identify such evidence now of record showing the inventions or species to be obvious variants or clearly admit on the record that this is the case. In either instance, if the examiner finds one of the inventions unpatentable over the prior art, the evidence or admission may be used in a rejection under 35 U.S.C.103(a) of the other invention.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caitlin Fogarty whose telephone number is 571-270-3589. The examiner can normally be reached on Monday - Friday 8:00 AM - 5:30 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vickie Kim can be reached on (571) 272-0579. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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